
Money and Emotions: How to rematerialize household accounting practices

Mark Huber

Human-Computer Interaction,
University of Siegen,
57068 Siegen, Germany
mark.huber153@gmail.com

Gunnar Stevens

Human-Computer Interaction,
University of Siegen,
57068 Siegen, Germany
gunnar.stevens@uni-siegen.de

Abstract

In this paper, we present a 4 week study of 6 households and their personal finance cash flow. Opinions about money, tracking behavior, sustainability and attitude towards savings were analyzed. The results lead to design solutions for App-Interfaces which support user with money-saving. The app gives the users a clear overview of their spending behavior and monthly cash flow. These UIs help rematerialize the abstract become money in the electronic payment world as well as give the ability of saving money by easily identifying high cost categories.

Author Keywords

Finance; money; personal finance; transparency

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ACM Classification Keywords

User Interfaces; user-centered design

Introduction

Payment options are becoming more electronically based. With decreasing usage of physical money, purchases are getting more and more convenient and efficient. Online payment providers, such as Click&Buy or PayPal, further shorten the already-efficient-way of online shopping. Multiple bank accounts and ways of payment make it hard to track expenses and follow the personal cash flow. The materiality of money as coins and bills is more and more replaced by the abstract number on a sheet of paper or on a screen. As stated in the household accounting literature [1], people indeed tend to track their expenses in multiple ways. However, there is few work that shows effectiveness of the single methods. The objective of HCI now is to support the embodiment of financial accounting and support users with keeping track of their spending behavior in multiple ways and saving money.

Theory

Research studies showed that incorrect recollection of past expenses is due to the lack of focus at point of purchase. A typical consumer has a clear idea of how much money he/she has in her bank accounts usually only once a month (around payday) [9]. Further research shows that the knowledge of the total cost of last purchase decreases probability of additional con-

sumption. Consumers paying with cash or checks are more likely to remember their expenses, because the physical gesture of counting the money or writing down the number on a check acts as a review process [2]. We believe the reason for this is the invisibility of electronic payment methods and the lack of transparency in the monthly cash flow. By not using physical money, the material awareness of financial activities is getting lost. This issue shows many parallels to the challenge of materializing energy consumption to promote sustainable life styles [11] (with the seminal difference household accounting mainly addresses economic sustainability, energy accounting [3] addresses the ecological one): Heating a room in a traditional way with fire requires actions such as chucking the wood, storing, drying and finally bringing it into a room and lighting it. In contrast to that, the modern way is to merely turn up/down the heat meter and adjust the temperature to one's content. With this method, users have lost all references to know how much energy (oil/gas/electricity) is used [11, 12]. In studies on energy consumption, it was shown that individuals reduced their consumption after having received information on their energy usage on a more frequent basis [13]. In one particular study on electronic consumption shows that consumption feedback has an positive effect on achieving lower energy consumption [5] and increasing the energy literacy [14].

Financial budget management is similar to energy consumption: Money is consumed, but without a manual method for tracking expenses, the exact spending behavior remains opaque.

The purpose of this paper is to make the cash flow visible so consumers know where their money goes and

how to reduce costs. This can be achieved by making consumption permanently transparent and decreasing the abstractness of pure numbers and digits. Persuasive design, as described in [4,5,6,7,8] is an effective design method to put more reference in numbers and build up a stronger connection to the present subject matter.

Study

6 households, 12 people in total, (mean age: 37.3y, range: 20 - 65y) were recruited to take part in the study. Participants were recruited in person by the researchers and no financial reward was given. 1 member of each household (2 men, 4 women) was interviewed about their monthly cash flow (mean age: 38.6y, range: 20 - 55y, SD: 16.1y). The 6 households contain 2 students, 2 couple households, 1 family (3 kids) and 1 Alumna (see Table 1).

Participant-No.	Gender, Age and Occupation
P1	Female, 55, Employee Male, 65, Retired
P2	Female, 22, Student
P3	Male, 56, IT Project Manager Female, 46, Controller Male, 10, Pupil Male, 24, Student Female, 21, Student
P4	Male, 53, Teacher Female, 50, Project Manager
P5	Female, 20, Student
P6	Female, 26, Alumna

Table 1: Testpersons' Gender, Age and Occupation

Three interviews were conducted. The first one (30 - 40min) gathered the general opinion about money and the spending behavior such as ways of staying sustainable, keeping track of expenses and their attitude towards savings. During the first interview the participants were asked several times about their emotional condition and how they feel when talking and thinking about money. After that, the participants were asked to track all of their expenses for 4 weeks. A follow-up interview (8 - 12min) was conducted to gather the impressions, problems and thoughts about the tracking period. In the third interview (4 - 12min) the interpretation of their expenses with visualizations of the categories purchased was presented.

Interview 1

TRACKING EXPENSES

Only 2 (P3, P4) out of the 6 households track expenses on a regular basis. P3 uses the program Quicken while P4 is using an Excel Spreadsheet. The rest mainly uses electronic payment and adjust their expenses according to the bank account statements.

SAVINGS

3 households (P2, P4, P5) claimed to save money monthly, but according to their tracked expenses only 1 household is actually saving a specific amount per month (P3). All participants find that saving is an important habit and would like to save more money for the future.

EMOTIONAL CONDITION

1 participant -according to his own statement - was feeling uncomfortable after being reminded on his/her out- and incomes. The rest was comfortable with talking about money and their expenses, however, only 1 household (P4) was satisfied with its cash flow.

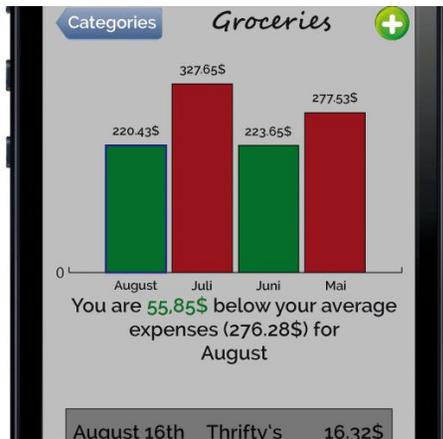
ESTIMATED EXPENSES

The participants were asked to estimate their monthly expenses (see Table 2).

P-No.	Expenses	Deviation	Expenses p.P./d
P1	978.78€	-9%	15.79€
P2	307.90€	-12%	9.93€
P3	4,453.68\$	12%	28.73\$
P4	4,796.00\$	42%	77.35\$
P5	729.39\$	31%	23.53\$
P6	322.85€	7%	10.41\$

Table 2: Estimation of Expenses and Deviation

These estimations were compared with the actual money spent (based on participants' trackings). Although P4 is using an expense tracking book, his estimation was the most deviated one. As it can be seen in Table 2, most (4 out of 6) of the test persons spent close to the estimated expenses (7-12%). This, however, refers to the costs in total. The deviation of estimated and actual costs for single categories is bigger than for the costs in total. An example, P1's estimations differ from 5 - 40% from the actual expenses (see Table 3). This shows that the knowledge of total expense doesn't necessarily mean the exact knowledge about the costs of single categories.



Category	Est. Expenses	Act. Expenses	Deviation
Energy	400€	419€	5%
Groceries	500-600€	350€	30-40%
Insurances	300-400€	161.80€	46-60%
Mortgage	1,200-1,400€	1,176.00€	2-16%
Total	3,100€	2,844.89€	-9%

Table 3: Estimated and actual Expenses of P1 (monthly)

Follow-up Interview 1 & 2

After the tracking phase, participants were interviewed again to gather potential problems, thoughts, likes and dislikes. All participants thought that tracking expenses was too time consuming and exhausting. The expenses were handed in handwritten (P1), via an Excel Spreadsheet file (P2, P3) or in a word document (P4, P5, P6). None of them used (mobile) expense tracking apps because they found that they were either too complex or not user friendly enough. P1 handwrote the expenses down during short breaks at work because she had no time to do it at home and Word or Excel is forbidden at her workplace. P2 and P3 used Excel because in their opinion the program gives a better overview. P4, P5 and P6 handed in Word documents because Word is very customizable and not limited by specific formats like lines and tables in Excel. In the second follow-up interview a pie chart of the expense categories formed earlier was presented. It allowed the participants to simply identify the categories with the highest expenses and the correlation to other costs. Given that, the



Figure 1: Category display (upper) and adding a new purchase (lower)

participants were able to reduce costs at specific categories if wanted:

P5: I think I could save a lot of money, if I cut down food and social expenses.

I: Did you know that before?

P5: Yes. Yeah, I knew it before but I guess not in the big picture. So, now the impact is bigger.

Results

Similarities between people of the same age or occupation, family, couple or single households are hard to conclude. All participants use or have used an expense tracking book. All of them complained about the required complexity and the high time consumption they need for keeping one. During the test phase, they used customizable methods for writing down the expenses (i.e. handwriting, MS-Excel or -Word). Tracking Apps were not used due to its complexity and low usability. Visualizing the monthly expenses (i.e. in a pie chart) in categories helps make the cash flow transparent and identifies the highest expenses. The visualization of the information gives a better connection to the subject matter than abstract numbers without reference (as presented on account statements) would. Also, in traditional tracking methods graphics and stats are barely used (even if available). For a more supportive App, it is important that expenses are a) easy and fast to type in, b) strongly associated with physical money to prevent inconsiderate purchases, c) designed to provide users a permanent visualization of their money consumption and d) gives users an orientation value according to which they can adjust expenses. Figure 1 shows possible design solutions. The user will be able to see if his/her monthly expenses (so far) is still within budget or has already gone above the average con-

sumption of the past months (upper). For adding a new purchase, the user has to drag bills or coins to a check-out (lower). With this method, instead of the traditional number pad, an easier and more interactive way of input is provided. Additionally, a connection to physical money is generated, in case of an electronic payment. [15] shows that the display of actual money bills helped people to remember the last expense. This again prevents additional purchases as stated in the theory part and helps save money [3].

Discussion

In this paper we presented a simple method of providing users with information about their personal finance management. A clear overview summarized in categories helps identify the biggest impact monthly cash flow. With persuasive design, money is rematerialized and users will be motivated to be more aware of their spending behavior while keeping track of their expenses. The interviews showed that estimations on the single-category expenses are mostly far from being correct. Therefore, the app encourages users to type in their expenses as frequent as possible, which then produces a most-accurate figure for their monthly expense. The design solutions bring transparency into an individual's spending behavior. Based on that, the user can decide which expenses he/she wants to track in order to reduce the personal average.

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